

Green Supply Chain Management Practices and Productivity of Manufacturing Firms in Port Harcourt

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Article History

Received: 23.06.2024

Accepted: 29.07.2024

Published: 03.08.2024

Abstract: This study examines the relationship between green supply chain management practices and productivity of manufacturing firms in Port Harcourt. Correlational survey design was adopted for this study. The population of this study is thirty-two (32) manufacturing companies in Rivers State which are registered with the Rivers State branch of Manufacturers Association of Nigeria (MAN). The study adopted the census population. 3 managers were selected from each firm multiplied by 32 firms gives us a total of ninety-two (92) for the study. Structured questionnaire instrument title the application of linear programming in assembly-line balancing of manufacturing firms in Port Harcourt questionnaire was developed on five-point likert scale. The result of the Cronbach's Alpha reliability test indicates .769 which is above .70 which implies that the items are reliable. PPMC (person product moment correlation) was used to test hypotheses on SPSS version 25. There is a significant relationship between green Design and productivity of manufacturing firms in Port Harcourt. There is a significant relationship between green Production and productivity of manufacturing firms in Port Harcourt. The study concluded that green supply chain management practices have a significant relationship with productivity of manufacturing firms in Port Harcourt. The study recommended Manufacturing firms in Port Harcourt should integrate sustainability considerations into their overall supply chain strategies to ensure that environmental concerns are addressed at every stage of the production process.

Keywords: Firms, Census Population, Cronbach's Alpha reliability test, PPMC (person product moment correlation).

BACKGROUND OF THE STUDY

Green supply chain management (GSCM) practices have gained significant attention in recent years due to the increasing awareness of environmental issues and sustainability concerns in the business world. GSCM involves integrating environmental considerations into all stages of the supply chain, including green design, green production, and green distribution. These practices aim to minimize the environmental impact of products throughout their lifecycle, from raw material sourcing to end-of-life disposal (Amadi, 2016).

Green design focuses on developing products that are environmentally friendly by considering factors such as recyclability, energy efficiency, and use of sustainable materials. Companies implementing green design principles strive to create products that have a reduced carbon footprint and minimize waste generation during manufacturing and use. Green production involves adopting eco-friendly manufacturing processes that reduce energy consumption, emissions, and waste generation. This may include using renewable energy sources, implementing lean manufacturing techniques to optimize resource utilization, and adopting cleaner production technologies (Jorgenson, 2005).

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CITATION: David Onwuchekwa & Oweisanda Ayibatariomono (2024). Green Supply Chain Management Practices and Productivity of Manufacturing Firms in Port Harcourt. *South Asian Res J Bus Manag*, 6(4), 180-188.

Eze (2020) Green distribution focuses on optimizing transportation and logistics operations to minimize fuel consumption, emissions, and packaging waste. Companies may implement strategies such as route optimization, modal shift to greener transport modes like rail or sea freight, and using eco-friendly packaging materials to reduce the environmental impact of product distribution. Overall, GSCM practices help companies enhance their environmental performance, comply with regulations, meet customer expectations for sustainable products, and achieve cost savings through improved resource efficiency.

Brynjolfsson and Lorin (2010) Productivity are a crucial concept in economics and business that measures the efficiency of production processes. It is defined as the ratio of output to input, indicating how effectively resources are being utilized to generate goods or services. There are several key aspects of productivity that are commonly studied in academic research: Operational productivity focuses on the efficiency of specific operations within an organization. This can include processes such as manufacturing, service delivery, or project management. Researchers analyze operational productivity to identify areas for improvement and optimize resource allocation. Labor productivity measures the output generated per unit of labor input. It is a key indicator of workforce efficiency and is often used to assess the performance of employees or entire industries. Labor productivity can be influenced by factors such as technology, training, and organizational structure. Total factor productivity represents the overall efficiency with which all inputs are utilized in production. Unlike labor productivity, TFP takes into account all factors of production, including capital, technology, and natural resources. Improvements in TFP are associated with economic growth and innovation.

The study on Green Supply Chain Management Practices and Productivity of Manufacturing Firms in Port Harcourt aims to investigate the relationship between the adoption of GSCM practices and the productivity of manufacturing firms in the region. By examining how GSCM practices are implemented and their impact on operational performance, this research seeks to provide insights into the potential benefits of sustainable supply chain management strategies for businesses operating in Port Harcourt (Brynjolfsson & Lorin 2010).

Key areas of focus in this study may include assessing the extent to which manufacturing firms in Port Harcourt have adopted GSCM practices, identifying specific green initiatives implemented within their supply chains, evaluating the effects of these practices on productivity metrics such as cost reduction, resource efficiency, waste minimization, and overall performance improvement. Additionally, factors influencing the adoption and effectiveness of GSCM practices in the context of Port Harcourt's business environment may be explored (Brynjolfsson, & Lorin 2010).

Overall, this study contributes to the growing body of research on sustainable business practices by examining the relationship between GSCM practices and firm productivity specifically within the manufacturing sector in Port Harcourt. The findings from this research can potentially inform policymakers, industry practitioners, and academics about the importance of integrating environmental considerations into supply chain management strategies for achieving both economic success and environmental sustainability.

Statement of the Problem

Green supply chain management practices refer to the integration of environmental considerations into supply chain management processes. In the context of manufacturing firms in Port Harcourt, Nigeria, there are several problems that can affect the implementation of green supply chain management practices and subsequently impact productivity. One of the primary challenges faced by manufacturing firms in Port Harcourt is the lack of awareness and education regarding green supply chain management practices. Many firms may not fully understand the benefits of implementing environmentally friendly practices or may not be aware of the available strategies to do so. Another significant issue is the limited resources available to manufacturing firms in Port Harcourt for investing in green technologies and sustainable practices. Implementing green supply chain management practices often requires upfront investments in new technologies, training programs, and infrastructure upgrades, which may be beyond the financial capabilities of many firms. Compliance with environmental regulations and standards can also pose a challenge for manufacturing firms in Port Harcourt. Failure to meet regulatory requirements can result in fines, penalties, or even shutdowns, making it essential for firms to invest in compliance measures.

The absence of government support and incentives for adopting green supply chain management practices can hinder progress in this area for manufacturing firms in Port Harcourt. Without policies that promote sustainability and provide financial assistance or tax incentives, firms may struggle to justify investments in environmentally friendly initiatives. Overall, addressing these challenges requires a concerted effort from manufacturing firms, government agencies, industry associations, and other stakeholders to promote awareness, provide resources, enforce regulations, foster collaboration with suppliers, and create a supportive policy environment for green supply chain management practices.

Conceptual Framework

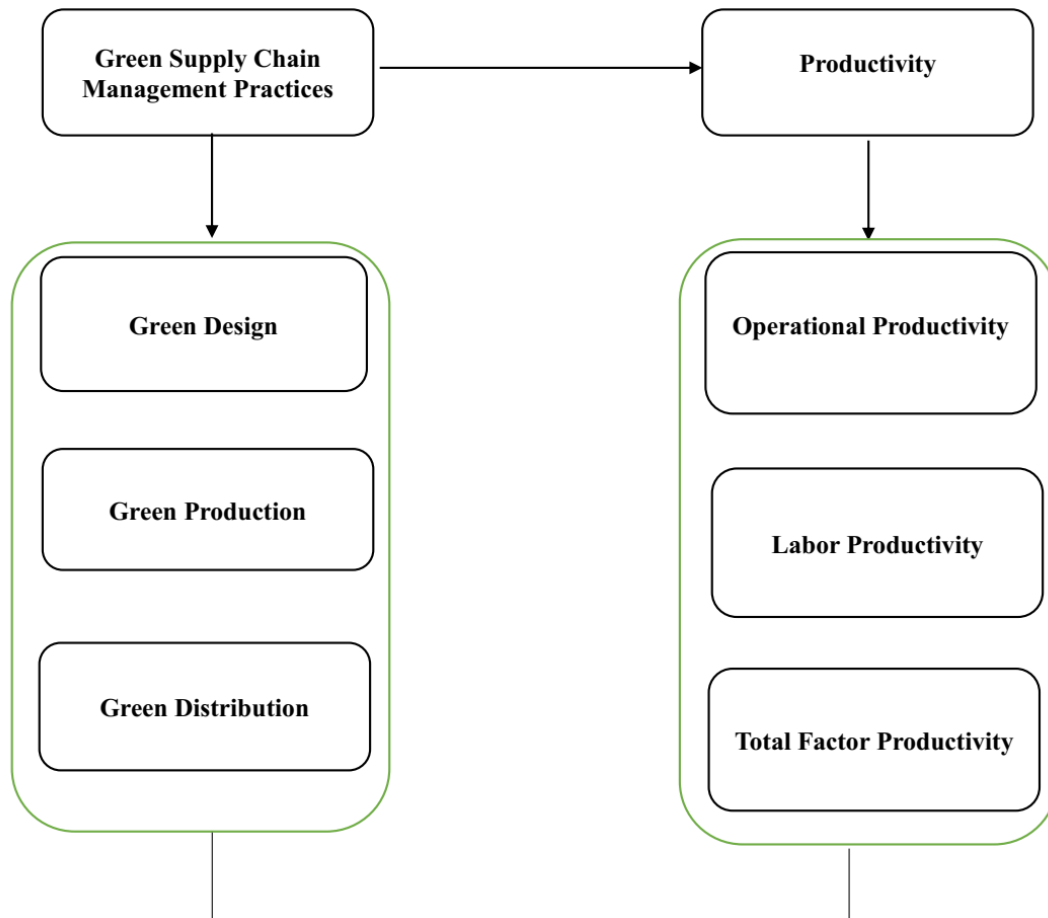


Figure 1: Conceptual framework on Green Supply Chain Management Practices and Productivity of Manufacturing firms in Port Harcourt

Source: Adapted from Carter (2011); Seuring and Martin (2008).

Aims & Objectives

The aim of this study is to determine the relationship between green supply chain management practices and productivity of manufacturing firms in Port Harcourt. The specific objectives are:

- 1) To determine the relationship between green Design and productivity of manufacturing firms in Port Harcourt.
- 2) To determine the relationship between green Production and productivity of manufacturing firms in Port Harcourt.
- 3) To determine the relationship between green distribution and productivity of manufacturing firms in Port Harcourt.

Research Questions

The following research questions were raised to guide the study.

- 1) What is the relationship between green Design and productivity of manufacturing firms in Port Harcourt?
- 2) What is the relationship between green Production and productivity of manufacturing firms in Port Harcourt?
- 3) What is the relationship between green distribution and productivity of manufacturing firms in Port Harcourt?

Hypothesis

The following null hypotheses were formulated and was tested at a significant level of 0.05.

HO₁: There is no significant relationship between green Design and productivity of manufacturing firms in Port Harcourt.

HO₂: There is no significant relationship between green Production and productivity of manufacturing firms in Port Harcourt.

HO₃: There is no significant relationship between green distribution and productivity of manufacturing firms in Port Harcourt.

REVIEW OF RELATED LITERATURE

This section reviews extant literatures under the headings of conceptual review, theoretical review and empirical review.

Conceptual Review

Green Supply Chain Management Practice

Green supply chain management (GSCM) is a holistic approach that integrates environmental considerations into all stages of the supply chain, including green design, green production, and green distribution. The goal of GSCM is to minimize the environmental impact of products and services throughout their lifecycle while also improving operational efficiency and reducing costs. Green supply chain management (GSCM) is a practice that integrates environmental considerations into the supply chain processes of an organization. It involves the implementation of environmentally friendly practices throughout the entire supply chain, from product design and sourcing to manufacturing, distribution, and end-of-life disposal. The goal of GSCM is to minimize the environmental impact of supply chain activities while maximizing efficiency and profitability (Carter & Rogers 2008).

Seuring and Muller (2008) One key aspect of GSCM is sustainable sourcing, which involves selecting suppliers who adhere to environmentally responsible practices. This can include sourcing materials from renewable sources, reducing waste and emissions in production processes, and ensuring ethical labor practices. By working with sustainable suppliers, organizations can reduce their carbon footprint and improve their overall environmental performance. Another important element of GSCM is green manufacturing, which focuses on reducing energy consumption, water usage, and waste generation in production processes. This can involve implementing energy-efficient technologies, recycling materials, and optimizing production processes to minimize environmental impact. Green manufacturing not only helps organizations reduce their environmental footprint but also often leads to cost savings and operational efficiencies.

Distribution and logistics are also critical components of GSCM. Organizations can reduce emissions and fuel consumption by optimizing transportation routes, using eco-friendly packaging materials, and implementing efficient warehousing practices. By streamlining distribution processes and reducing unnecessary transportation miles, companies can lower their carbon emissions and operating costs. End-of-life disposal is another important consideration in GSCM. Organizations can implement strategies such as product take-back programs, recycling initiatives, and proper disposal methods to minimize waste sent to landfills and reduce environmental pollution. By designing products with recyclability in mind and facilitating the recycling process for customers, companies can close the loop on their supply chain sustainability efforts. Overall, green supply chain management practices offer numerous benefits for organizations, including cost savings, regulatory compliance, enhanced brand reputation, and reduced environmental impact. By integrating sustainability into every aspect of the supply chain, companies can create a competitive advantage while contributing to a more sustainable future (Sarkis 2012).

Dimensions of Green Supply Chain Management Practice

Green Design

Green design involves incorporating environmental considerations into the product development process. This includes using eco-friendly materials, designing products for recyclability or reusability, and reducing energy consumption during the product's use phase. By considering environmental factors early in the design process, companies can create products that have a lower carbon footprint and are more sustainable (Handfield *et al.*, 2005).

Green Production

Green production focuses on reducing the environmental impact of manufacturing processes. This can include implementing energy-efficient technologies, optimizing resource usage, reducing waste generation, and minimizing emissions. Green production practices not only benefit the environment but can also lead to cost savings through improved efficiency and reduced waste disposal costs (Zhu *et al.*, 2007).

Green Distribution

Green distribution involves optimizing transportation and logistics operations to minimize carbon emissions and reduce fuel consumption. This can be achieved through route optimization, modal shift to greener transport modes such as rail or sea freight, consolidation of shipments to reduce empty miles, and use of alternative fuels or electric vehicles. By greening their distribution networks, companies can reduce their carbon footprint and contribute to a more sustainable transportation system. Overall, implementing green supply chain management practices can bring several benefits to organizations, including cost savings through improved efficiency, enhanced brand reputation as a socially responsible company, compliance with environmental regulations, and access to new markets with increasing demand for sustainable products (Sarkis J 2012).

Concept of Productivity

Productivity refers to the efficiency and effectiveness of an organization's operations in producing goods or services. It is a key performance indicator that measures the output generated from a given set of resources, such as labor, capital, and technology. Improving operational productivity is crucial for organizations to remain competitive in today's fast-paced business environment (Johnson, 2015).

Measures of Operational Productivity

Labor Productivity

Labor productivity is a measure of the efficiency of labor in producing goods or services. It is calculated by dividing the total output by the total number of hours worked. Improving labor productivity involves optimizing workforce management, training employees, and implementing technology to streamline processes (Smith, 2007).

Total Factor Productivity (TFP)

Total factor productivity measures the overall efficiency of all inputs used in production, including labor, capital, and technology. It reflects how effectively these inputs are combined to produce output. Increasing TFP often involves innovation, technological advancements, and process improvements (Johnson, 2015).

Operational Productivity

Smith (2007) Operational productivity refers to the efficiency and effectiveness of an organization's operations in producing goods or services. It is a measure of how well resources are utilized to achieve the desired output. Improving operational productivity is crucial for organizations to remain competitive in the market, increase profitability, and meet customer demands.

Theoretical Review

Resource-Based View (RBV) Theory

The Resource-Based View (RBV) is a theoretical framework in strategic management that focuses on the internal resources and capabilities of a firm as sources of sustainable competitive advantage. The RBV suggests that a firm's unique resources, such as valuable assets, skills, knowledge, and capabilities, can enable it to achieve superior performance and competitive advantage in the marketplace. The theory was first proposed by Edith Penrose in her book "The Theory of the Growth of the Firm" published in 1959. However, it was further developed and popularized by scholars such as Jay Barney and Birger Wernerfelt in the 1980s and 1990s.

Assumptions of the Resource-Based View theory include:

1. Resources heterogeneity: Firms possess different sets of resources and capabilities.
2. Resource immobility: Resources are not perfectly mobile between firms.
3. Resource durability: Resources are not easily replicable or substituted.
4. Resource value: Resources must add value to the firm's products or services.
5. Resource rarity: Resources must be rare or scarce among competitors.

The relevance of the RBV theory to the study of Green Supply Chain Management practices and productivity of manufacturing firms in Port Harcourt lies in its emphasis on leveraging internal resources for competitive advantage. In the context of sustainability and environmental responsibility, firms can use their unique resources and capabilities to develop green supply chain practices that reduce environmental impact, enhance operational efficiency, and improve overall productivity. By applying the principles of RBV to Green Supply Chain Management, manufacturing firms in Port Harcourt can create a sustainable competitive advantage while contributing to environmental conservation efforts.

One prominent theory is the resource-based view (RBV), which suggests that a firm's resources and capabilities, including its adoption of GSCM practices, can lead to sustainable competitive advantage and improved performance. According to this theory, firms that effectively implement green practices in their supply chains can achieve cost savings, operational efficiency, and enhanced reputation, ultimately leading to increased productivity.

Stakeholder Theory

Stakeholder theory is a management theory that suggests that a firm should consider the interests of all stakeholders, not just shareholders, when making decisions. The theory was propounded by R. Edward Freeman in 1984. Stakeholders are individuals or groups who have an interest in the activities of a business and can affect or be affected by the achievement of the organization's objectives. The key assumption of stakeholder theory is that organizations are responsible to a broader range of stakeholders beyond just shareholders, including employees, customers, suppliers, communities, and society at large. The theory emphasizes the importance of managing relationships with these stakeholders to ensure long-term success and sustainability.

In the context of green supply chain management practices and productivity of manufacturing firms in Port Harcourt, stakeholder theory is highly relevant. Green supply chain management involves integrating environmental considerations into the supply chain processes to minimize negative impacts on the environment while maximizing economic and social benefits. By adopting stakeholder theory, manufacturing firms in Port Harcourt can engage with various stakeholders such as government agencies, local communities, environmental organizations, suppliers, and customers to develop sustainable practices that benefit all parties involved. This approach can lead to improved environmental performance, enhanced reputation, increased efficiency, and ultimately higher productivity for manufacturing firms. Another relevant theory is stakeholder theory, which emphasizes the importance of considering the interests of various stakeholders, including customers, suppliers, employees, and the community, in shaping a firm's sustainability strategy. By engaging with stakeholders and aligning their interests with green initiatives, manufacturing firms in Port Harcourt can create value for all parties involved while improving their overall performance.

Empirical Review

Oke, (2018) undertook a study on Green Supply Chain Management Practices and Performance of Manufacturing Firms in Nigeria. Population of the study was Manufacturing firms in Port Harcourt, Nigeria with a Sample Size of 150 manufacturing firms. Method of Data Analysis was REGRESSION analysis. The study found a positive relationship between green supply chain management practices and the productivity of manufacturing firms in Port Harcourt. The study concluded that implementing green supply chain management practices can enhance the performance and productivity of manufacturing firms. The study recommends that manufacturing firms in Port Harcourt should adopt and implement green supply chain management practices to improve their productivity.

Nwagbara, (2017) carried out a study on the Impact of Green Supply Chain Management Practices on Firm Performance: Evidence from the Nigerian Manufacturing Sector. Population of the study was manufacturing firms in Port Harcourt, Nigeria with a Sample Size of 100 manufacturing firms. Method of Data Analysis was Structural equation modeling (SEM). The study revealed a significant positive impact of green supply chain management practices on firm performance in the Nigerian manufacturing sector. The study concluded that embracing green supply chain management practices can lead to improved firm performance. The study suggests that manufacturing firms in Port Harcourt should integrate green practices into their supply chain operations to enhance their performance.

Okoli, (2019) undertook a study on Sustainable Supply Chain Management Practices and Firm Performance: A Study of Manufacturing Firms in Port Harcourt. Population of the study was Manufacturing firms in Port Harcourt, Nigeria with a Sample Size of 120 manufacturing firms. Descriptive statistics and correlation analysis was used. The study found a positive correlation between sustainable supply chain management practices and firm performance among manufacturing firms in Port Harcourt. The study concluded that adopting sustainable supply chain management practices can positively impact the performance of manufacturing firms. The study recommends that manufacturing firms in Port Harcourt should prioritize sustainability initiatives within their supply chains to enhance their overall performance.

Eze, (2020) carried out a study on The Role of Green Supply Chain Management Practices on the Productivity of Manufacturing Firms: A Case Study of Port Harcourt". Population of the study was Manufacturing firms in Port Harcourt, Nigeria with a Sample Size of 80 manufacturing firms. Method of Data Analysis was ANOVA and regression analysis. The study indicated a significant relationship between green supply chain management practices and the productivity levels of manufacturing firms in Port Harcourt. The study concluded implementing green supply chain management practices is crucial for enhancing the productivity of manufacturing firms. The study suggests that manufacturing firms in Port Harcourt should invest in eco-friendly initiatives within their supply chains to improve productivity.

Amadi, (2016) carried out a study on Environmental Sustainability Practices and Firm Performance: A Study of Manufacturing Firms in Port Harcourt. Population of the study was Manufacturing firms in Port Harcourt, Nigeria with a Sample Size of 90 manufacturing firms. Method of Data Analysis was Multiple regression analysis. The study demonstrated a positive association between environmental sustainability practices and firm performance among manufacturing companies in Port Harcourt. The study concluded that incorporating environmental sustainability practices into business operations can lead to enhanced firm performance. The study recommends that manufacturing companies in Port Harcourt should prioritize environmental sustainability initiatives within their operations to improve overall performance.

METHODOLOGY

Correlational survey design was adopted for this study. The population of this study is thirty-two (32) manufacturing companies in Rivers State which are registered with the Rivers State branch of Manufacturers Association of Nigeria (MAN). The study adopted the census population. 3 managers were selected from each firm multiplied by 32 firms gives us a total of ninety-two (92) for the study. Structured questionnaire instrument title the application of linear

programming in assembly-line balancing of manufacturing firms in Port Harcourt questionnaire was developed on five-point likert scale.

Green supply chain management practice and productivity questionnaire was independently subjected to content and construct validity by three Lecturers in the Department of Management, Faculty of Management Sciences, Ignatius Ajuru University of Education, Port Harcourt. The corrections and suggestions of the validators were affected on the finale copy of the instrument. The reliability of empirical measurement is indicated by the internal consistency, one of the most commonly used indicators of internal consistency is Cronbach’s alpha coefficient. Questionnaire item statements with Cronbach’s alpha reliability coefficient below the 0.70 threshold were eliminated. The test-re-test method was used. 10 copies of the questionnaire instrument were issue and some later same copies were issue through electronic media. The results were used in computation using Cronbach’s alpha test of reliability.

Table 1: Reliability Statistics

Cronbach's Alpha	N of Items
.769	4

Source: Researcher Computation via SPSS Version 25

The result of the Cronbach's Alpha reliability test indicates .769 which is above .70 which implies that the items are reliable. PPMC (person product moment correlation) was used to test hypotheses on SPSS version 25.

Analysis of Data

HO₁: There is no significant relationship between green design and productivity of manufacturing firms in Port Harcourt.

Table 2: Correlations on Green Design and Productivity

		Green Design	Productivity
Green Design	Pearson Correlation	1	.832**
	Sig. (2-tailed)		.000
	N	92	92
Productivity	Pearson Correlation	.832**	1
	Sig. (2-tailed)	.000	
	N	92	92
**. Correlation is significant at the 0.01 level (2-tailed).			

Table 2 Correlations on green design and productivity revealed that there is a significant relationship between green design and productivity of manufacturing firms in Port Harcourt (where P .832 = sig. .000) thus leading to acceptance of alternate hypothesis: There is a significant relationship between green design and productivity of manufacturing firms in Port Harcourt.

HO₂: There is no significant relationship between green production and productivity of manufacturing firms in Port Harcourt.

Table 3: Correlations on Green Production and Productivity

		Green Production	Productivity
Green Production	Pearson Correlation	1	.799**
	Sig. (2-tailed)		.000
	N	92	92
Productivity	Pearson Correlation	.799**	1
	Sig. (2-tailed)	.000	
	N	92	92
**. Correlation is significant at the 0.01 level (2-tailed).			

Table 3 Correlations on green production and productivity revealed that there is a significant relationship between green production and productivity of manufacturing firms in Port Harcourt (where P .799 = sig. .000) thus leading to acceptance of alternate hypothesis: There is a significant relationship between green production and productivity of manufacturing firms in Port Harcourt.

HO₃: There is no significant relationship between green distribution and productivity of manufacturing firms in Port Harcourt.

Table 4: Correlations on Green Distribution and Productivity

		Green Distribution	Productivity
Green Distribution	Pearson Correlation	1	.827**
	Sig. (2-tailed)		.000
	N	92	92
Productivity	Pearson Correlation	.827**	1
	Sig. (2-tailed)	.000	
	N	92	92
**. Correlation is significant at the 0.01 level (2-tailed).			

Table 4 Correlations on green distribution and productivity revealed that there is a significant relationship between green distribution and productivity of manufacturing firms in Port Harcourt (where $P = .827 = \text{sig. } .000$) thus leading to acceptance of alternate hypothesis: There is a significant relationship between green distribution and productivity of manufacturing firms in Port Harcourt.

DISCUSSION OF FINDINGS

Table 2 Correlations on green design and productivity revealed that there is a significant relationship between green design and productivity of manufacturing firms in Port Harcourt (where $P = .832 = \text{sig. } .000$) thus leading to acceptance of alternate hypothesis: There is a significant relationship between green design and productivity of manufacturing firms in Port Harcourt. Table 3 Correlations on green production and productivity revealed that there is a significant relationship between green production and productivity of manufacturing firms in Port Harcourt (where $P = .799 = \text{sig. } .000$) thus leading to acceptance of alternate hypothesis: There is a significant relationship between green production and productivity of manufacturing firms in Port Harcourt. Table 4 Correlations on green distribution and productivity revealed that there is a significant relationship between green distribution and productivity of manufacturing firms in Port Harcourt (where $P = .827 = \text{sig. } .000$) thus leading to acceptance of alternate hypothesis: There is a significant relationship between green distribution and productivity of manufacturing firms in Port Harcourt.

Similarly, Nwagbara, (2017) carried out a study on the Impact of Green Supply Chain Management Practices on Firm Performance: Evidence from the Nigerian Manufacturing Sector. The study revealed a significant positive impact of green supply chain management practices on firm performance in the Nigerian manufacturing sector. The study concluded that embracing green supply chain management practices can lead to improved firm performance. The study suggests that manufacturing firms in Port Harcourt should integrate green practices into their supply chain operations to enhance their performance. Also, Okoli, (2019) undertook a study on Sustainable Supply Chain Management Practices and Firm Performance: A Study of Manufacturing Firms in Port Harcourt. The study found a positive correlation between sustainable supply chain management practices and firm performance among manufacturing firms in Port Harcourt. The study concluded that adopting sustainable supply chain management practices can positively impact the performance of manufacturing firms. The study recommends that manufacturing firms in Port Harcourt should prioritize sustainability initiatives within their supply chains to enhance their overall performance.

In the same vein, Eze, (2020) carried out a study on The Role of Green Supply Chain Management Practices on the Productivity of Manufacturing Firms: A Case Study of Port Harcourt". The study indicated a significant relationship between green supply chain management practices and the productivity levels of manufacturing firms in Port Harcourt. The study concluded Implementing green supply chain management practices is crucial for enhancing the productivity of manufacturing firms. The study suggests that manufacturing firms in Port Harcourt should invest in eco-friendly initiatives within their supply chains to improve productivity.

CONCLUSION

The study concluded that green supply chain management practices have a significant relationship with productivity of manufacturing firms in Port Harcourt. Green supply chain management practices have become increasingly important for manufacturing firms in Port Harcourt, as they seek to reduce their environmental impact and improve their productivity. By implementing sustainable practices throughout their supply chain, firms can not only enhance their environmental performance but also achieve cost savings, operational efficiencies, and competitive advantages.

RECOMMENDATIONS

1. Manufacturing firms in Port Harcourt should integrate sustainability considerations into their overall supply chain strategies to ensure that environmental concerns are addressed at every stage of the production process.
2. Fostering strong partnerships with suppliers who share the same commitment to sustainability can help manufacturing firms in Port Harcourt source eco-friendly materials and implement green practices effectively.

3. Investing in energy-efficient technologies and renewable energy sources can help manufacturing firms in Port Harcourt reduce their carbon footprint and improve operational efficiency.
4. Providing training programs for employees on green supply chain practices and fostering a culture of sustainability within the organization can lead to increased awareness and participation in environmental initiatives.

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